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EXAMINER	
ABDELNOUR, AHMED F	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/771,577	KADATCH, ANDREW	
	Examiner	Art Unit	
	Farras Abdelnour	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *June 1, 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Guidelines Section IV.B, reads as follows:

> "The burden is on the USPTO to set forth a prima facie case of unpatentability. Therefore if the examiner determines that it is more likely than not that the claimed subject matter falls outside of all statutory categories, the examiner must provide an explanation."

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

2. Claims 1-13 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 1-13 define a computer program embodying functional descriptive material. However, the claim does not define

a computer-readable medium or computer-readable memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests amending the claim(s) to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory (refer to "note" below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Note:

A "signal" (or equivalent) embodying functional descriptive material is neither a process nor a product (i.e., a tangible "thing") and therefore does not fall within one of the four statutory classes of § 101. Rather, "signal" is a form of energy, in the absence of any physical structure or tangible material.

Should the full scope of the claim as properly read in light of the disclosure encompass non-statutory subject matter such as a "signal", the claim as a whole would be non-statutory. In the case where the specification defines the computer readable medium or memory as statutory tangible products such as a hard drive, ROM, RAM,

etc, as well as a non-statutory entity such as a "signal", "carrier wave", or "transmission medium", the examiner suggests amending the claim to *include* the disclosed tangible computer readable media, while at the same time *excluding* the intangible media such as signals, carrier waves, etc.

3. Claims 14-28 are rejected under 35 U.S.C. 101 because the claimed invention falls outside of the statutory categories. While these claims define a "process", or "method, intrinsic evidence within the specification suggests that the method is drawn to steps performed purely by software (i.e., see paragraph starting at page 6, line 4 of the specification, which states, "As used in this application, the term "component" is intended to refer to a computer-related entity, either hardware, a combination of hardware and software, software, or software in execution."), and software *per se* is neither a "product" nor a "process" in a statutory sense. That is, software is not a physical thing and therefore not a product, and software is not a series of steps *per se*, and therefore not a "process". The aforementioned intrinsic evidence in the specification suggests that the full scope of the claimed method encompasses nothing more than software and is therefore non-statutory for that reason. ("Therefore if the examiner determines that it is more likely than not that the claimed subject matter falls outside of all statutory categories, the examiner must provide an explanation." Guidelines Section IV.B).

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Nonfunctional descriptive material that does not constitute a statutory process, machine, manufacture or composition of matter and should be rejected under 35 U.S.C. Sec. 101. Certain types of descriptive material, such as music, literature, art, photographs and mere arrangements or compilations of facts or data, without any functional interrelationship is not a process, machine, manufacture or composition of matter. USPTO personnel should be prudent in applying the foregoing guidance. Nonfunctional descriptive material may be claimed in combination with other functional descriptive multi-media material on a computer-readable medium to provide the necessary functional and structural interrelationship to satisfy the requirements of 35 U.S.C. Sec. 101. The presence of the claimed nonfunctional descriptive material is not necessarily determinative of nonstatutory subject matter. For example, a computer that recognizes a particular grouping of musical notes read from memory and upon recognizing that particular sequence, causes another defined series of notes to be played, defines a functional interrelationship among that data and the computing processes performed when utilizing that data, and as such is statutory because it implements a statutory process.

5. Claim 30 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 30 recites a data structure (data packets) which does not impart functionality to a computer or computing device, and is thus considered nonfunctional descriptive material. Such nonfunctional descriptive material, in the absence of a functional interrelationship with a computer, does not constitute a statutory process, machine, manufacture or composition of matter and is thus non-statutory per se.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 2, 14, 15, 29, and 30-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Ratnakar US 2002/000143 A1 ("Wavelet transform coding technique").

Regarding Claim 1, Ratnakar discloses a system that facilitates data compression, comprising:

a component that receives an N-dimensional image, where N is any integer from one to infinity ("This invention relates generally to an image compression/decompression technique," page 1, [0003]); and

a compression component that utilizes, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image ("local-index coding uses a small palette specific to a single image block. If a block cannot be coded using global- or local-index coding, then that block is classified as a natural image block. The lossless coding technique itself is used to compress natural image blocks," page 2, [0026]).

Regarding Claim 2, Ratnakar discloses the system of claim 1, the N-dimensional image comprising a two-dimensional image (Consult figure 8, "Input image").

Regarding Claim 14, Ratnakar discloses a method for facilitating data compression, comprising:

receiving an N-dimensional image, where N is any integer from one to infinity (Consult figure 8, "Input image");

and

utilizing, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image ("local-index coding uses a small palette specific to a single

image block. If a block cannot be coded using global- or local-index coding, then that block is classified as a natural image block. The lossless coding technique itself is used to compress natural image blocks," page 2, [0026]).

Regarding Claim 15, Ratnakar discloses the method of claim 14, the N-dimensional image comprising a two-dimensional image (Consult figure 8, "Input image").

Regarding Claim 29, Ratnakar discloses a system that facilitates data compression, comprising:

means for obtaining an N-dimensional image (Figure 9, "Scanner" and "Digital camera"); and

means for utilizing, at least in part, locally-adaptive, lossless palettization to facilitate in compressing the N-dimensional image ("local-index coding uses a small palette specific to a single image block. If a block cannot be coded using global- or local-index coding, then that block is classified as a natural image block. The lossless coding technique itself is used to compress natural image blocks," page 2, [0026]; also consult Figure 8).

Regarding Claim 30, Ratnakar discloses a data packet transmitted between two or more computer components that facilitates image compression ("Image data and computer software may also be transferred between computer system 200 and remote locations," page 9 [0247]), the data packet comprising, at least in part, information relating to an image compression system that utilizes, at least in part, locally-adaptive, lossless palettization to facilitate image compression ("In operation, the CPU 201 of computer system 200 may receive uncompressed hybrid color image data from storage device 207 or 210, or from a network 220 or external system 221," page [0249]).

Regarding Claim 31, Ratnakar discloses a computer readable medium having stored thereon computer executable components of the system of claim 1 ("Software for TROBIC may be stored on storage devices 207 and 210 and transferred to CPU 201 for execution. Alternatively, such software may be stored in RAM 202 or ROM 203," page 9 [0245]).

Regarding Claims 32, Ratnakar discloses a device employing the method of claim 14 comprising at least one selected from the group consisting of a computer, a server, and a handheld electronic device ("Computer system 200 comprises a central processing unit (CPU) 201 which may be a conventional microprocessor, a random access memory (RAM) 202 for temporary storage of information, and a read only memory (ROM) 203 for permanent storage of information," page 9 [0243]).

Regarding Claims 33, Ratnakar discloses a device employing the system of claim 1 comprising at least one selected from the group consisting of a computer, a server, and a handheld electronic device ("Computer system 200 comprises a central processing unit (CPU) 201 which may be a conventional microprocessor, a random access memory (RAM) 202 for temporary storage of information, and a read only memory (ROM) 203 for permanent storage of information," page 9 [0243]).

8. Claims 1-3, 6, 9, 10, 14, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Po *et al.* ("Block address predictive colour quantisation image compression," L.-M. Po, W.-T. Tan; Electronics Letters, Vol.30, Iss.2, 20 Jan 1994, Pages: 120-121).

Regarding Claim 1, Po *et al.* discloses a system that facilitates data compression, comprising:

a component that receives an N-dimensional image, where N is any integer from one to infinity ("Colour quantisation (CQ) [1-3] is, therefore, required for displaying these images on palette-based display systems," page 120, column 1);

and

a compression component that utilizes, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image ("The basic idea of block address predictive colour quantisation coding (BAPCQC) is to apply the APCQC technique on an image sub-block and adaptively select the colour level for the image sub-block," page 120, second column). While Po *et al.* does not explicitly describe its image compression scheme as lossless, it is explicitly mentioned in Po *et al.* ("Quadtree based colour quantization image compression," L.M. Po, W.T. Tan, W.B. Wong; Electronics Letters, Vol.31, Iss.23, 9 Nov 1995, Pages:1988-1990).

Regarding Claim 2, Po *et al.* discloses the system of claim 1, the N-dimensional image comprising a two- dimensional image ("Image coding system," figure 1, page 120).

Regarding Claim 3, Po *et al.* discloses the system of claim 1, the compression component employing the locally- adaptive, lossless palettization when characteristics of image data related to the N-dimensional image are equal to or below a threshold value ("For adaptive colour level selection, therefore, we can introduce a threshold value on the partition selection criterion of the conventional colour quantisation algorithm," page 121, column 1).

Regarding Claim 6, Po *et al.* discloses the system of claim 1, the compression component optimizing compression of the N-dimensional image by ordering indices representative of image data and reducing indices bit counts as values of indices decrease ("Colour palette ordering and colour-level selection: To exploit the redundancy of the palettised image sub-blocks, a very simple colour palette ordering method is developed for BAFCQC," page 120, column 2).

Regarding Claim 9, Po *et al.* discloses the system of claim 1, the compression component optimizing compression of the N-dimensional image. The system of claim 1, the locally-adaptive, lossless palettization comprising, at least in part, splitting the N-dimensional image into macroblocks ("The input image is first partitioned into 32 x 32 image sub-blocks and each sub-block is colour quantised with colour palette ordering and adaptive colour level selection which is according to the colour contents of the image sub-block," page 120, column 2).

Regarding Claim 10, Po *et al.* discloses the system of claim 9, the locally-adaptive, lossless palettization further comprising, at least in part, further splitting the macroblocks to facilitate compression ("At each step of the partition, a decision must be made as to which subregions should be further partitioned (partition selection criterion) and an appropriate hyperplane chosen to subdivide the region," page 121, column 1).

Regarding Claim 14, Po *et al.* discloses a method for facilitating data compression, comprising:

receiving an N-dimensional image, where N is any integer from one to infinity ("Colour quantisation (CQ) [1-3] is, therefore, required for displaying these images on palette-based display systems," page 120, column 1);

and

utilizing, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image ("The basic idea of block address predictive colour quantisation coding (BAPCQC) is to apply the APCQC technique on an image sub-block and adaptively select the colour level for the image sub-block," page 120, second column).

Regarding Claim 15, Po *et al.* discloses the method of claim 14, the N-dimensional image comprising a two-dimensional image ("Image coding system," figure 1, page 120).

9. Claims 1, 2, 14, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Sharpe *et al.* ("JPEG 2000 options for document image compression," L.H. Sharpe II and B. Manns, Proc. SPIE Int. Soc. Opt. Eng. 4670, 167 (2001)).

Regarding Claim 1, Sharpe *et al.* discloses a system that facilitates data compression, comprising:

a component that receives an N-dimensional image, where N is any integer from one to infinity ("JPEG 2000 is a versatile standard with applicability to a wide variety of image types," page 167, section 1); and

a compression component that utilizes, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image ("JPEG 2000 supports

palettized images through the optional JP2 file format. The format includes provisions for an optional palette table that associates a color or gray value with each row of the table. Each row then implicitly represents an index value. No wavelet transform is applied; the entropy coder is used to losslessly compress the index values," page 169, section 3.2).

Regarding Claim 2, Sharpe *et al.* discloses the system of claim 1, the N-dimensional image comprising a two-dimensional image ("JPEG 2000 options for document image compression," page 167).

Regarding Claim 14, Sharpe *et al.* discloses a method for facilitating data compression, comprising:

receiving an N-dimensional image, where N is any integer from one to infinity ("JPEG 2000 is a versatile standard with applicability to a wide variety of image types," page 167, section 1);

and

utilizing, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image ("JPEG 2000 supports palettized images through the optional JP2 file format. The format includes provisions for an optional palette table that associates a color or gray value with each row of the table. Each row then implicitly represents an index value. No wavelet transform is applied; the entropy coder is used to losslessly compress the index values," page 169, section 3.2).

Regarding Claim 15, the method of claim 14, the N-dimensional image comprising a two-dimensional image ("JPEG 2000 options for document image compression," page 167).

10. Claims 1, 2, 14 and 15 are rejected under 35 U.S.C. 102(a) as being anticipated by A.J. Pinho *et al.* ("JPEG 2000 coding of color-quantized images," A.J. Pinho and A.J.R. Neves; ICIP. Proc. of International Conference on Image Processing, Vol.2, 14-17 Sept. 2003, Pages: II-181-4 vol.3).

Regarding Claim 1, Pinho *et al.* discloses a system that facilitates data compression, comprising:

a component that receives an N-dimensional image, where N is any integer from one to infinity ("Color-quantized images are usually represented by a matrix of indexes," page II-181, first column);

and

a compression component that utilizes, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image ("Table 1 shows JPEG 2000 lossless compression results of the reordered index images, with the use of local histogram packing ("Packing" column) and without it ("Normal" column)," page II-182, second column).

Regarding Claim 2, Pinho *et al.* discloses the system of claim 1, the N-dimensional image comprising a two-dimensional image ("More precisely, we provide experimental results showing that the JPEG 2000 lossless compression of palette reordered color-

quantized natural images can be further improved if histogram packing is applied on a regional basis," page II-181, column 1).

Regarding Claim 14, Pinho *et al.* discloses a method for facilitating data compression, comprising:

receiving an N-dimensional image, where N is any integer from one to infinity ("Color-quantized images are usually represented by a matrix of indexes," page II-181, first column);

and

utilizing, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image ("Table 1 shows JPEG 2000 lossless compression results of the reordered index images, with the use of local histogram packing ("Packing" column) and without it ("Normal" column)," page II-182, second column).

Regarding Claim 15, Pinho *et al.* discloses the method of claim 14, the N-dimensional image comprising a two-dimensional image ("More precisely, we provide experimental results showing that the JPEG 2000 lossless compression of palette reordered color-quantized natural images can be further improved if histogram packing is applied on a regional basis," page II-181, column 1).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Po *et al.* as applied to claims 1 and 3 above, and Sharpe *et al.*

Regarding claim 4, which states, "the system of claim 3, the characteristics of the image data comprising at least one selected from the group consisting of pixel colors and pixel grayscales", Po *et al.* teaches locally adaptive, lossless palettization for the purpose of image compression. Po *et al.* further teaches lossless data compression using subblocks and palettization which is determined according to a threshold value.

While Po *et al.* does address color images (Figure 1, page 120), Po et al. does not explicitly address grayscale images.

Sharpe II *et al.* in the same field of data compression teaches palettization of both color and grayscale images ("JPEG 2000 supports palettized images through the optional JP2 file format. The format includes provisions for an optional palette table that associates a color or gray value with each row of the table," page 169, section 3.2).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the Po et al. system to process, in addition to color images, grayscale images as taught by Sharpe, so as to allow more efficient storage and transmission of grayscale and other monochromatic images while preserving their integrity.

Regarding claim 5, Po discloses a threshold value comprising a maximum number of at least one selected from the group consisting of pixel colors and pixel grayscales ("This means that when the algorithm finds that the largest eigenvalue for

further node splitting is less than the predefined threshold, the CQ algorithm will stop and output the current colour level and colour palette," page 121, column 1).

As modified by Sharpe in the claim 4 rejection above, Po also addresses grayscale images.

13. Claim 7 rejected under 35 U.S.C. 103(a) as being unpatentable over Po *et al.* as applied to claim 1, and W. Zeng *et al.* ("An efficient color re-indexing scheme for palette-based compression," W. Zeng, J. Li, and S. Lei; Proc. of International Conference on Image Processing (ICIP), 2000, Pages:476-479 vol.3, Vancouver, BC).

Claim 7 states the following: The system of claim 1, the compression component further utilizing a one- dimensional compression technique to further compress the N-dimensional image.

Po *et al.* teaches locally adaptive, lossless palettization for the purpose of image compression.

Po *et al.* does not explicitly teach one dimensional compression techniques.

Zeng *et al.* teaches one-dimensional compression of images using Lempel-Ziv methods ("The Lempel-Ziv compression, however, treats the image as a one-dimensional sequence of index values," page 476, section 1).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Po *et al.*, by applying the Lempel-Ziv one-dimensional compression of Zeng in addition to the compression already taught by Po, so as to further compress large images for the purpose of transmission over the internet while

benefiting from Lempel-Ziv's lossless compression property allowing image integrity, in addition to Lempel-Ziv's scheme efficiently exploiting the inherent redundancy of typical images (highly correlated pixels).

14. Claim 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Po *et al.* and W. Zeng as applied to claim 7, and further in combination with Su *et al.* ("Hardware efficient updating technique for LZW CODEC design," C. Su, C.-F. Yen, and J.-C. Yo; ISCAS, Proc. of IEEE International Symposium on Circuits and Systems, Vol.4, 9-12 Jun 1997, Pages:2797-2800 vol.4).

Claim 8 states the following: The system of claim 7, the one-dimensional technique comprising at least one selected from the group consisting of LZ77 compression and LZ78 compression.

While Po *et al.* as modified by Zeng teaches locally adaptive, lossless palettization for the purpose of image compression comprising one dimensional compression techniques, the Po and Zeng combination does not teach the usage of LZ77 and LZ78 one-dimensional compression schemes.

Zeng *et al.* teaches one-dimensional compression of images using Lempel-Ziv methods, but do not explicitly suggest the use of LZ77 and LZ78 schemes. Su *et al.* teaches using LZ77 and LZ78 compression schemes for the purpose of one-dimensional compression. ("Ziv-Lempel coding takes a *greedy parsing* approach to split text into phrases. Therefore, it is suitable for real-time and on-line applications. Ziv-Lempel codings are divided into two families: *LZ77* and *LZ78* [1, 21]. The dictionary of

LZ77 is a fixed-size window of the previous inputs. The code is the offset and the length of the longest match in the window. Therefore, it has an adaptive dictionary. The dictionary of LZ78 is the phrases that had appeared previously," page 2797, section 1).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Lempel-Ziv compression of the Po and Zeng combination, by using LZ78 or LZ77 schemes as taught by Su, so as to further compress images for the purpose of transmission over the internet using well established dictionary-based compression schemes which benefits from the inherent redundancy of image patterns, leading to efficient image coding.

15. Claims 11 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Ratnakar as applied to claim 1, and Inoue *et al.* US 5787471 ("Cache memory management apparatus having a replacement method based on the total data retrieval time and the data size")

Claim 11 states the following:

The system of claim 1, the locally-adaptive, lossless palettization further comprising a last recently used (LRU) buffer for indexing image data.

While Ratnakar teaches lossless palette coding using image blocks, Ratnakar does not teach LRU buffering for indexing image data.

Inoue *et al.* teaches LRU buffering data for efficient usage of memory ("The data cache unit 45 can store only a predetermined amount of data. Accordingly, if the data management unit 42 tries to store more than a predetermined amount of data into the

data cache unit 45, the data cache unit 45 operates a so-called LRU (Last Recently Used) algorithm on reference information managed by the data reference management unit 44 to replace the last recently used data, which had not been referred to for the longest period, with newly obtained data. Frequently retrieved data is, however, provided with residence priority by the residence priority, application unit 46, and data with residence priority will not be exposed to such replacement," column 1, line 41).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Inoue's LRU data management to Ratnakar's lossless palettization for the purpose of efficient memory usage in data and image processing.

Claim 12 states the following:

The system of claim 11, the LRU buffer maintains image data in relative order to facilitate further compression.

While Ratnakar teaches lossless palette coding using image blocks, Ratnakar does not teach LRU buffering for maintaining image data in a given order.

Inoue et al. teach buffering data for efficient usage of memory ("The data cache unit 45 can store only a predetermined amount of data. Accordingly, if the data management unit 42 tries to store more than a predetermined amount of data into the data cache unit 45, the data cache unit 45 operates a so-called LRU (Last Recently Used) algorithm on reference information managed by the data reference management unit 44 to replace the last recently used data, which had not been referred to for the longest period, with newly obtained data. Frequently retrieved data is, however,

provided with residence priority by the residence priority, application unit 46, and data with residence priority will not be exposed to such replacement," column 1, line 41).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Inoue's LRU data management to Ratnakar's lossless palettization for the purpose of efficient data compression implementation while preserving image's integrity.

16. Claim 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Ratnakar as applied to claim 1, and Pan *et al.* US 2003/0189576 A1 ("Method and apparatus for displaying higher color resolution on a hand-held LCD device"). Claim 13 states the following:

The system of claim 1, the locally-adaptive, lossless palettization comprising dynamic, locally-adaptive, palettization.

While Ratnakar teaches lossless palette coding using image blocks, Ratnakar does not teach dynamic palettization.

Pan *et al.* teaches a dynamic updating of color palette data ("Through this dynamic updating of the color palette information, we can completely change the background color palette information at the rate of every other line," page 4, [0050]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Pan's dynamic updating method to Ratnakar's lossless palette coding using image blocks for the purpose of faster and more efficient usage of the color palette for lossless image compression.

17. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ratnakar as applied to claim 14, and W. Zeng *et al.* ("An efficient color re-indexing scheme for palette-based compression," W. Zeng, J. Li, and S. Lei; Proc. of International Conference on Image Processing (ICIP), 2000, Pages:476-479 vol.3, Vancouver, BC). Claim 16 states the following:

The method of claim 14, further comprising: compressing an output of the locally-adaptive, lossless palettization utilizing a one-dimensional technique to further reduce redundancies.

While Ratnakar teaches locally adaptive, lossless palettization for the purpose of image compression, Ratnakar does not explicitly teach one dimensional compression techniques.

Zeng *et al.* teaches one-dimensional compression of images using Lempel-Ziv methods ("The Lempel-Ziv compression, however, treats the image as a one-dimensional sequence of index values," page 476, section 1).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Lempel-Ziv one dimensional compression to Ratnakar's image compression scheme so as to further compress large images for the purpose of transmission over the internet while benefiting from Lempel-Ziv's lossless compression property allowing image integrity, in addition to Lempel-Ziv's scheme efficiently exploiting the inherent redundancy of typical images (highly correlated pixels).

18. Claim 17 rejected under 35 U.S.C. 103(a) as being unpatentable over Ratnakar and Zeng as applied to claim 16, and further in combination with Su *et al.* ("Hardware

efficient updating technique for LZW CODEC design," C. Su, C.-F. Yen, and J.-C. Yo; ISCAS, Proc. of IEEE International Symposium on Circuits and Systems, Vol.4, 9-12 Jun 1997, Pages:2797-2800 vol.4). Claim 17 states the following:
The method of claim 16, the one-dimensional technique comprising at least one selected from the group consisting of LZ77 compression and LZ78 compression.

Po *e t al.* teaches locally adaptive, lossless palettization for the purpose of image compression. Po *et al.* does not explicitly teach one dimensional compression techniques.

Zeng *et al.* teaches one-dimensional compression of images using Lempel-Ziv methods, but do not explicitly suggest the use of LZ77 and LZ78 schemes. Su *et al.* teaches using LZ77 and LZ78 compression schemes for the purpose of one-dimensional compression. ("Ziv-Lempel coding takes a *greedy parsing* approach to split text into phrases. Therefore, it is suitable for real-time and on-line applications. Ziv-Lempel codings are divided into two families: *LZ77* and *LZ78* [1, 21]. The dictionary of LZ77 is a fixed-size window of the previous inputs. The code is the offset and the length of the longest match in the window. Therefore, it has an adaptive dictionary. The dictionary of LZ78 is the phrases that had appeared previously," page 2797, section 1).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Lempel-Ziv one-dimensional compression using LZ78 or LZ77 schemes so as to further compress images losslessly using well established efficient string matching techniques for the purposes of data storage and transmission over the internet.

Non-Art Rejected Subject Matter

19. Claim 18 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 101, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims (i.e., claim 14).

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Clark *et al.* US 6501852 B1 ("Method and component for serialization of images"); "The piecewise-constant image model," P.J. Ausbeck Jr., Proc. of the IEEE, Vol.88, Iss.11, Nov 2000, Pages:1779-1789.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farras Abdelnour whose telephone number is 571-270-1806. The examiner can normally be reached on Mon. - Thurs. 7:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on 571-272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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